FIG. 1

$$
\begin{array}{cccc}
a_{11} & a_{12} & & a_{1n} \\
a_{21} & a_{22} & \bullet\bullet\bullet & a_{2n} \\
a_{31} & a_{32} & & a_{3n} \\
\vdots & \vdots & & \vdots \\
a_{m-1,1} & a_{m-1,2} & \bullet\bullet\bullet & a_{m-1,n} \\
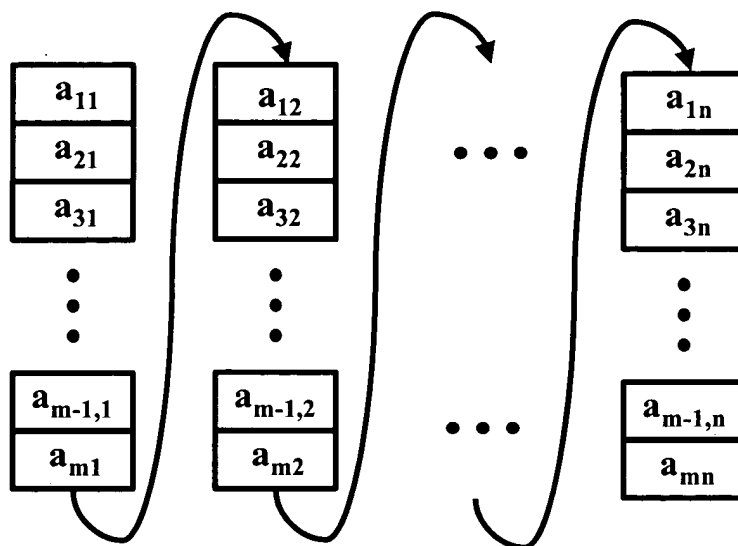a_{m1} & a_{m2} & & a_{mn}
\end{array}
$$

FIG. 2

Row-oriented algorithm:

```
nrows = 32768; ncolumns = 1024;
A = rand(nrows, ncolumns);
B = zeros(size(A));
v = rand(1, ncolumns);
tic, for j = 1:nrows
    B(j,:) = A(j,:).* v;
end, toc
```

Column-oriented algorithm:

```
nrows = 1024; ncolumns = 32768;
A = rand(nrows, ncolumns);
B = zeros(size(A));
v = rand(nrows, 1);
tic, for j = 1:ncolumns
    B(:,j) = A(:,j).* v;
end, toc
```
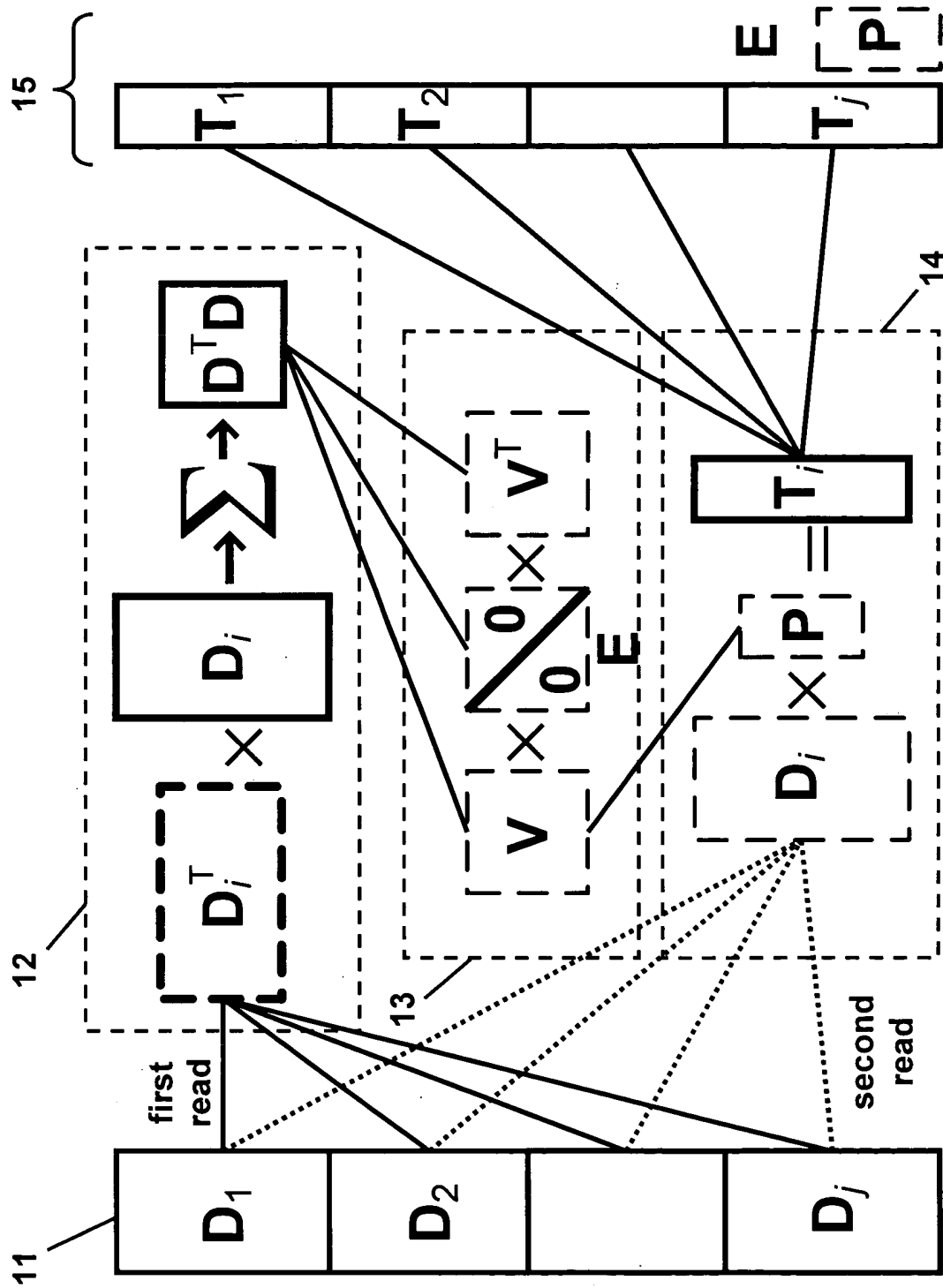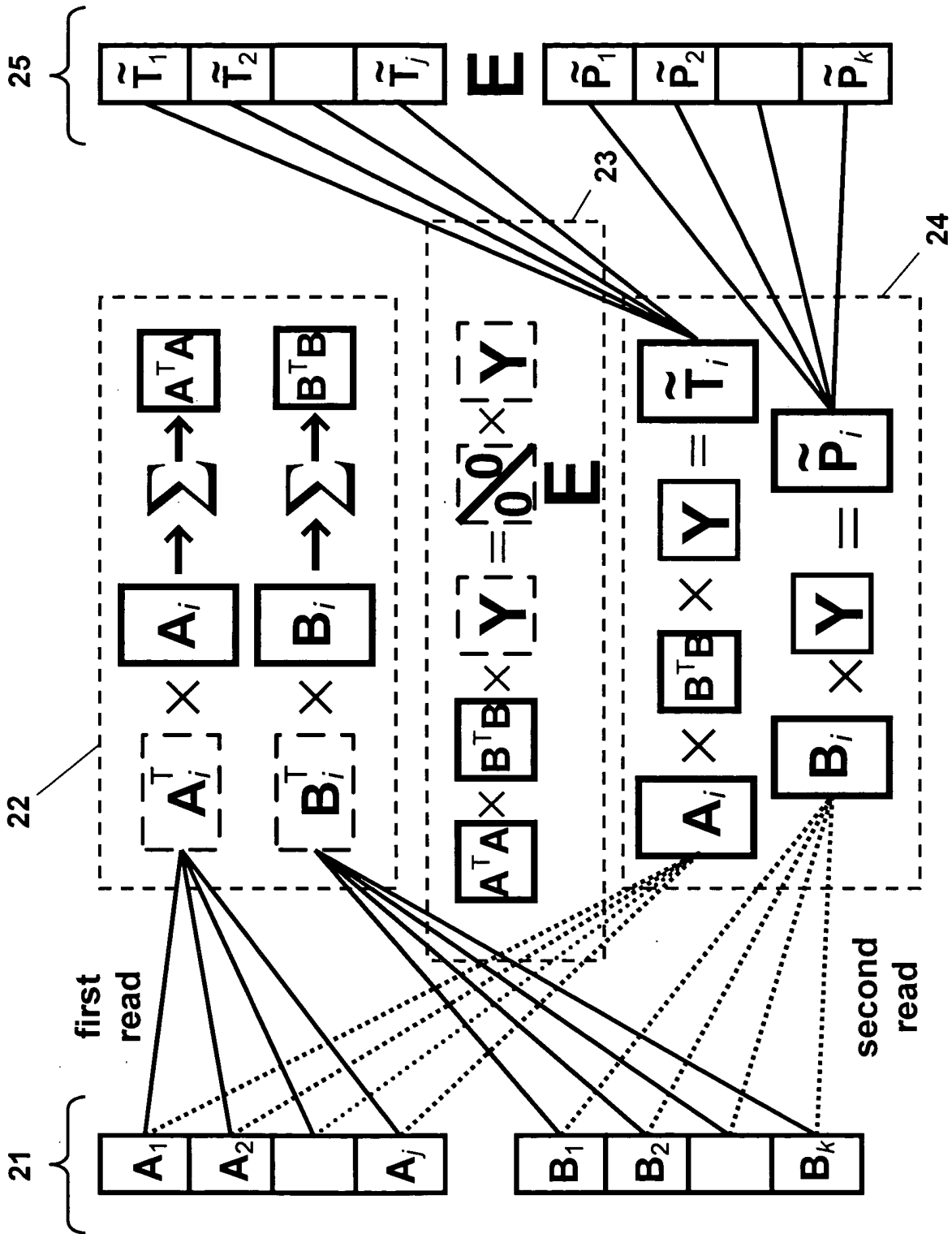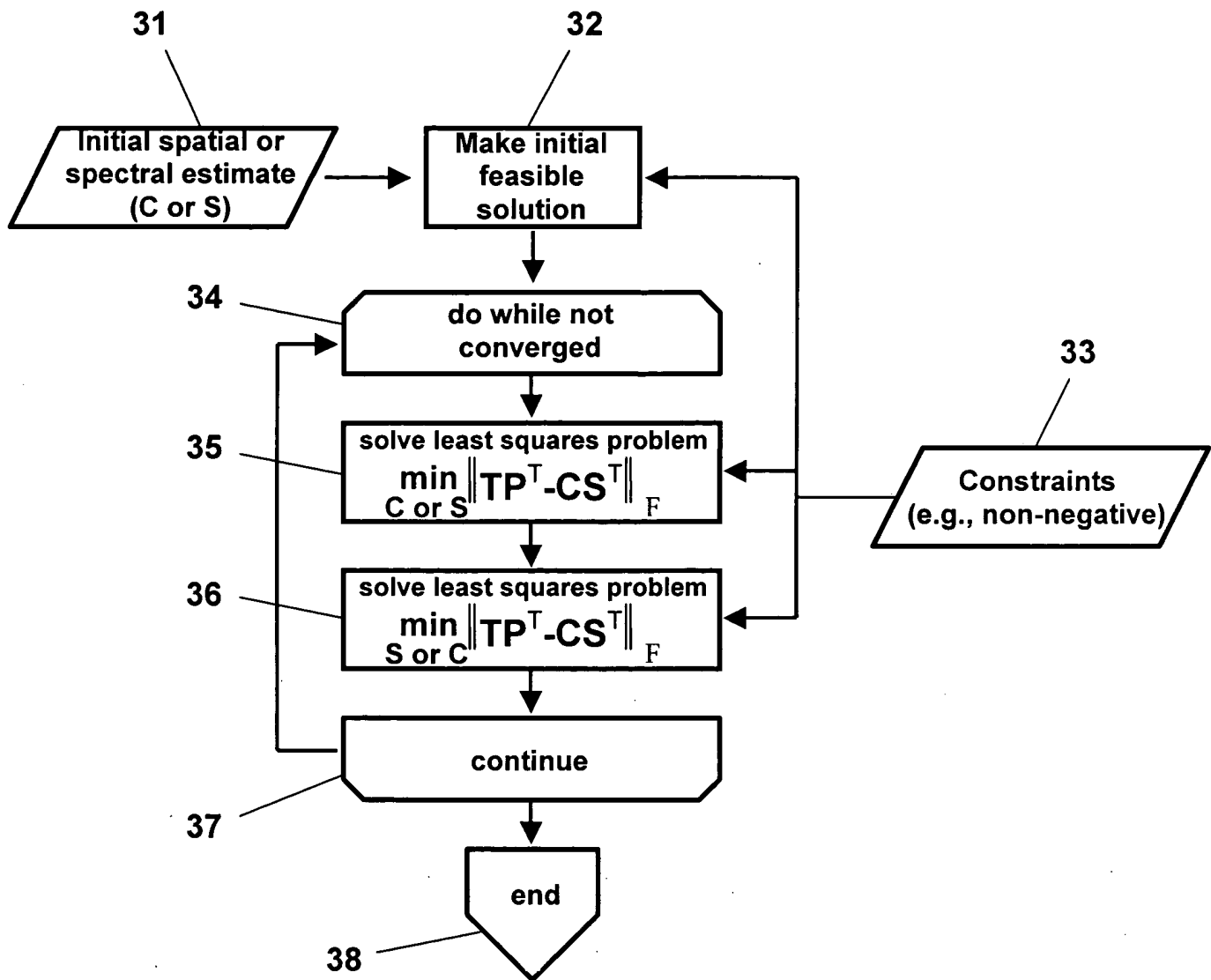
FIG. 3

FIG. 4

FIG. 5

31

32

Initial spatial or spectral estimate (C or S)

Make initial feasible solution

34

do while not converged

33

35

solve least squares problem
$$\min_{C \text{ or } S} \| TP^T - CS^T \|_F$$

Constraints (e.g., non-negative)

36

solve least squares problem
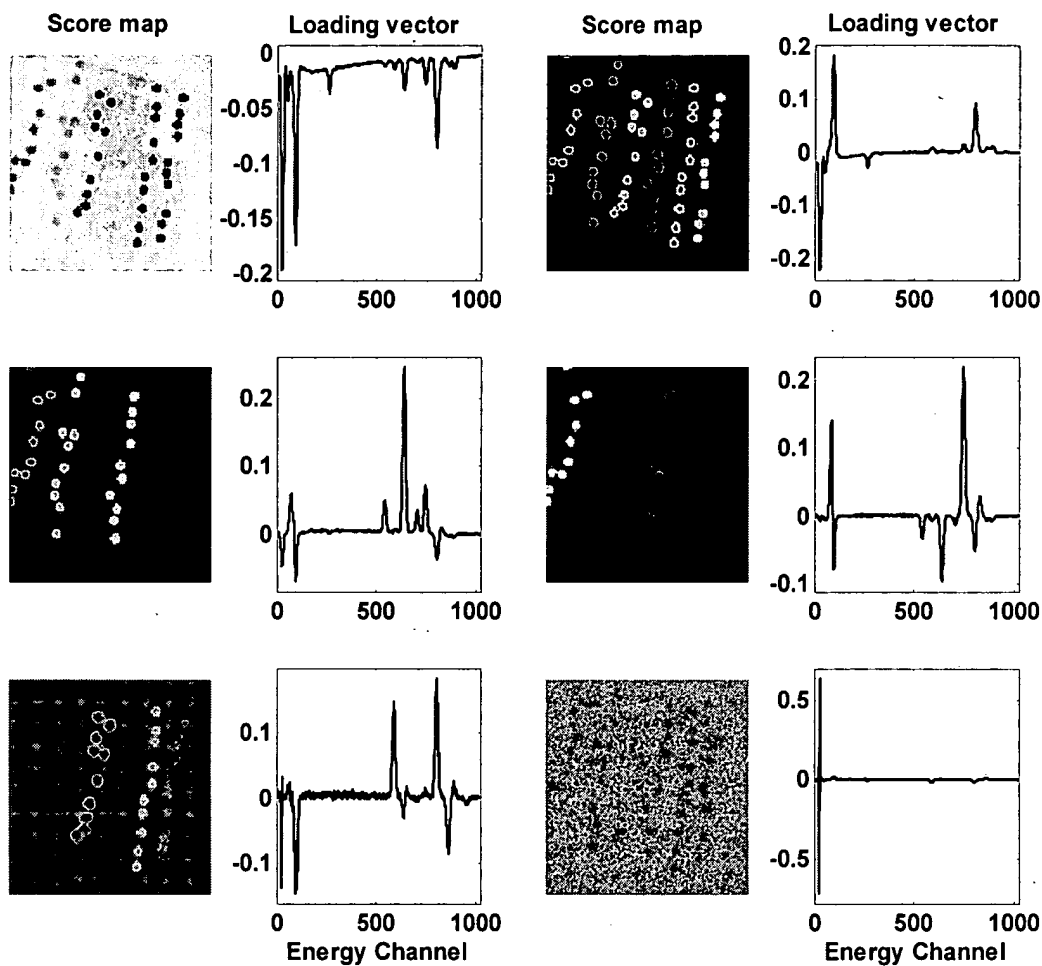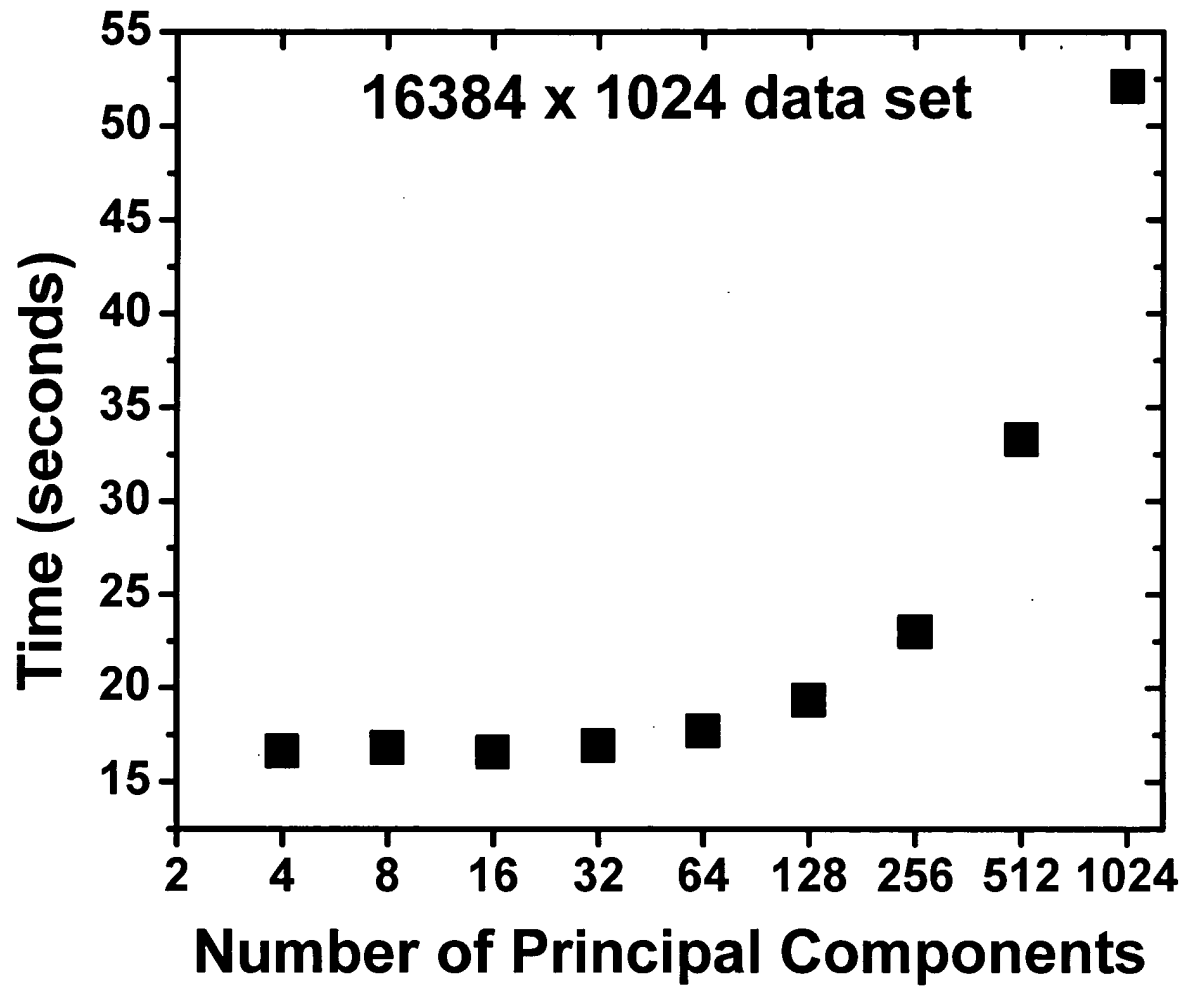$$\min_{S \text{ or } C} \| TP^T - CS^T \|_F$$

37

continue

38

end

FIG. 6

FIG. 7

FIG. 8

FIG. 9B

FIG. 9A

$$\mathbf{W}_m \times \left(\begin{matrix} m \\ n \end{matrix} \underline{\mathbf{D}} \; p \right) \times \mathbf{W}_n^{\mathsf{T}} = \underline{\widetilde{\mathbf{D}}}$$
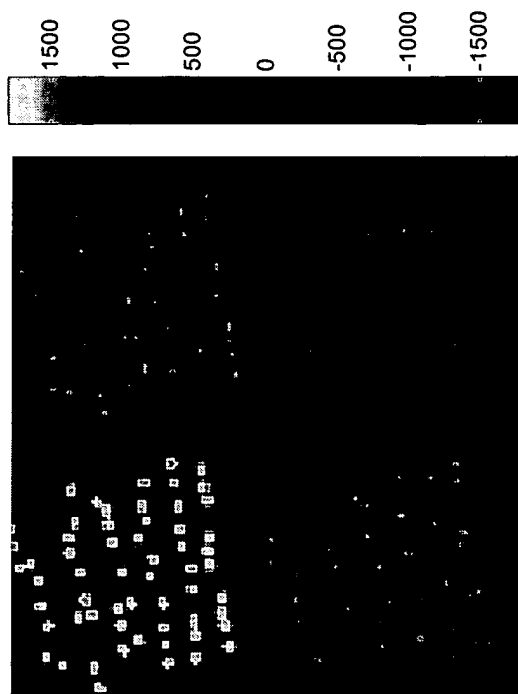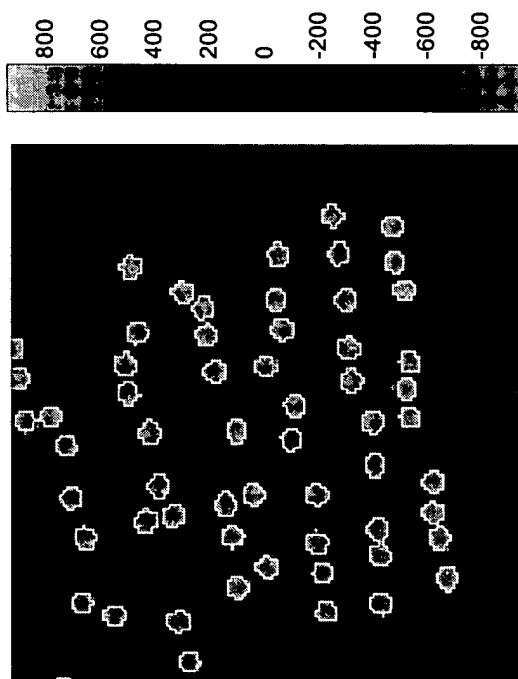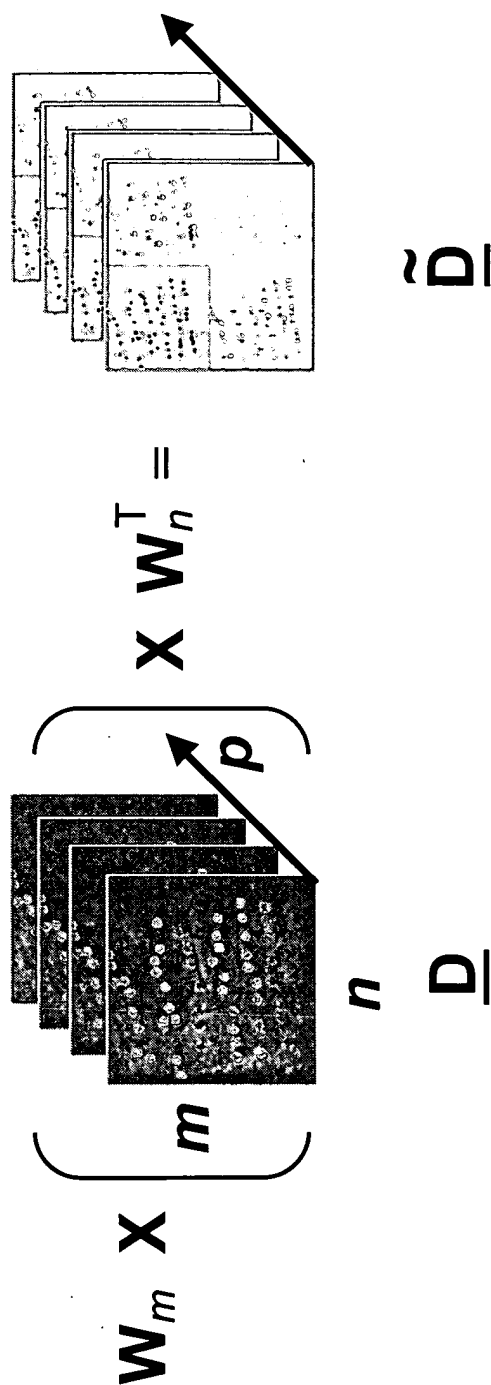
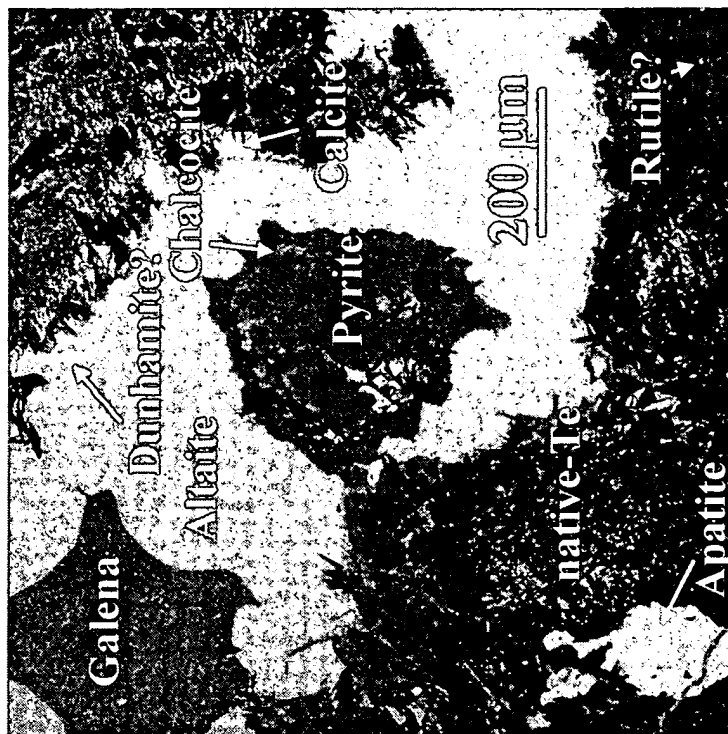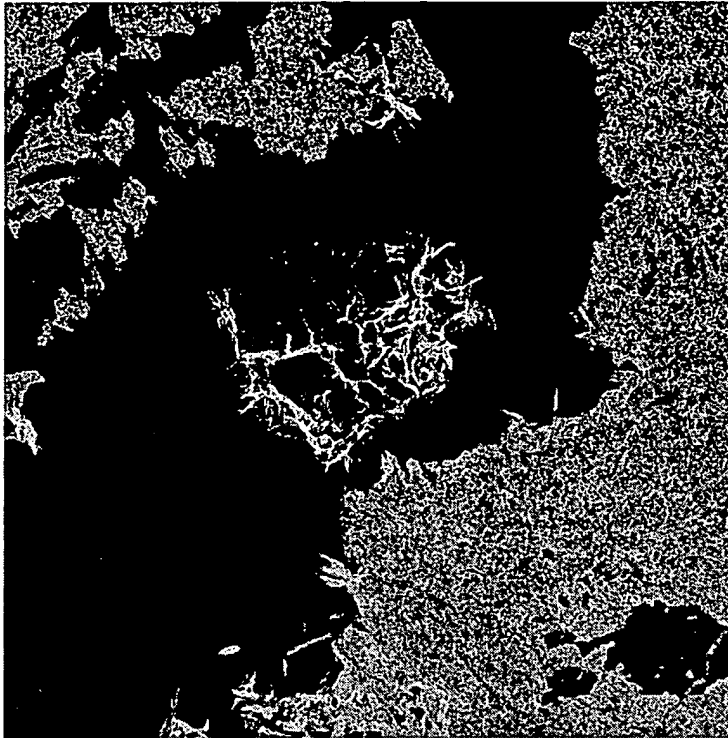FIG. 10
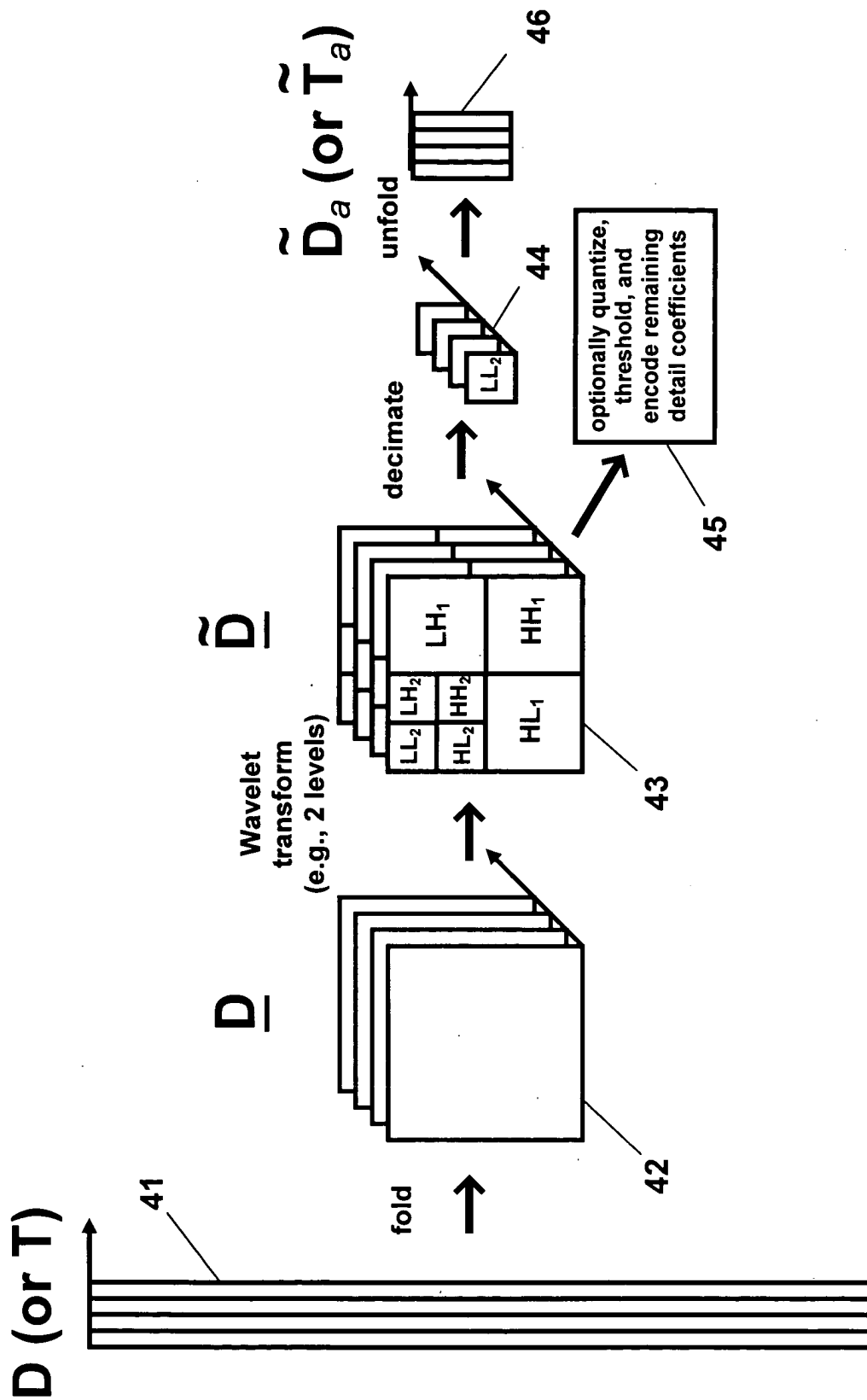
FIG. 11
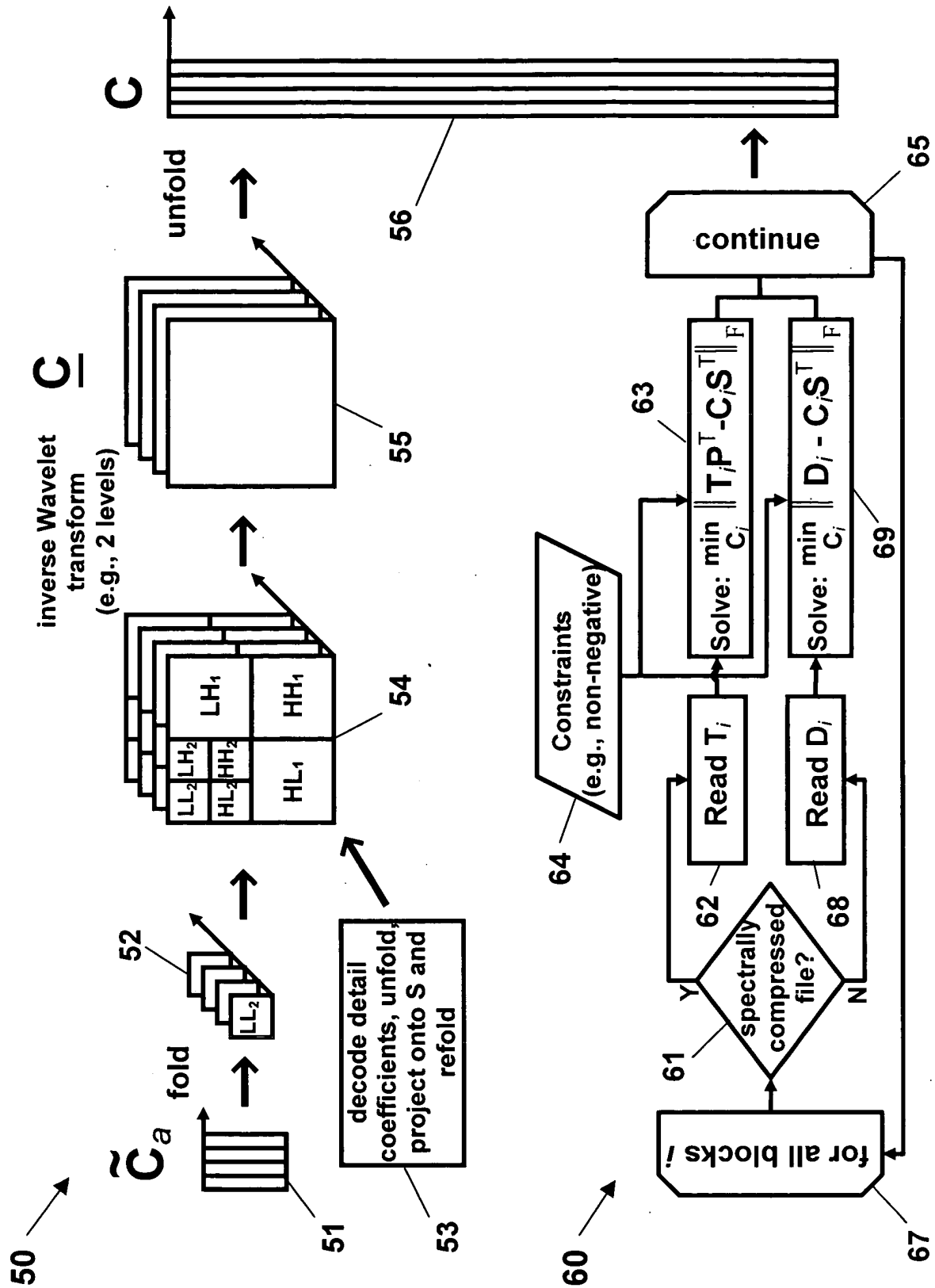
FIG. 12

FIG. 13B

FIG. 13A
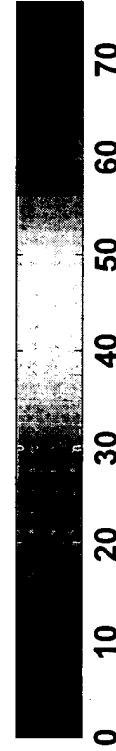
FIG. 13D

FIG. 13C

FIG. 14

FIG. 15